What is a High Q Tail?

A high Q tail (remember we plot reflectivity in k, which is Q/2) is a feature that appears in data taken at higher incident angles, which can be attributed to subtracting insufficient background from a specular reflection prior to calculating reflectivity. In addition to generating a region of increasing reflectivity (the upward curve of the tail) this insufficient subtraction will also extend the Q range of the data (the length of the tail).

This problem with subtraction occurs because, for higher Q data, the auto pick subroutine in the Analyze Reflectivity Data IDL program makes poor choices for background (and sometimes signal) regions, or it makes good choices, but is overridden by user entered regions. Here is an example of incorrect user entered regions:
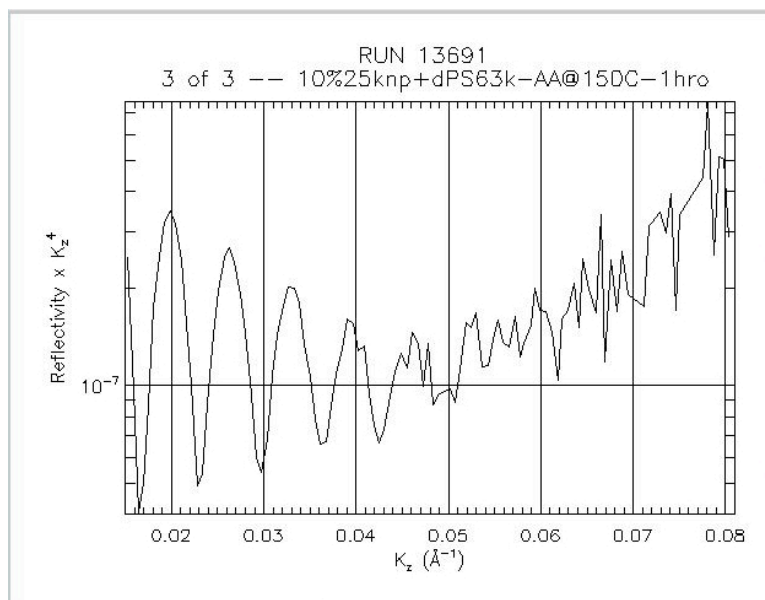

and the associated plot
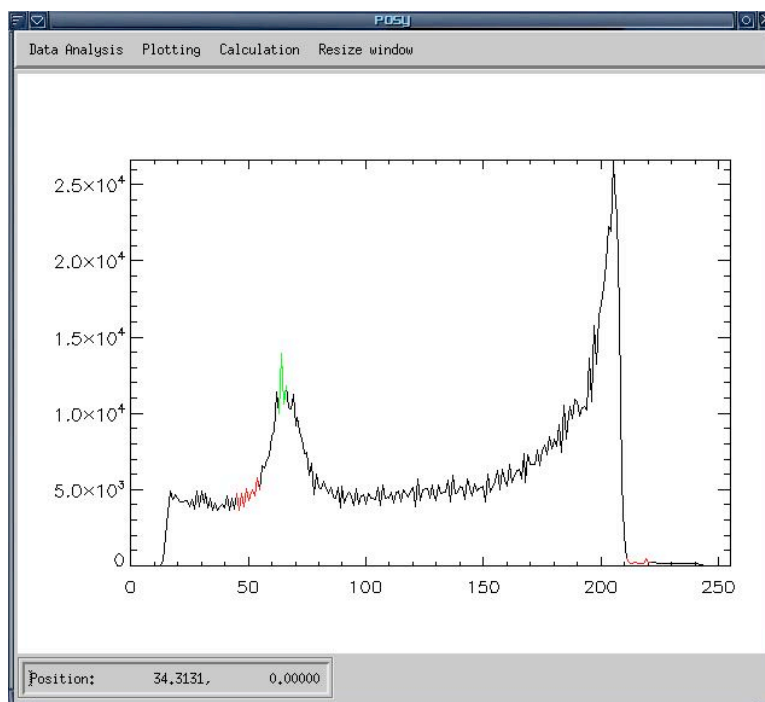
Note that the signal region is anisotropic, and only four channels wide, and the right background is too far away from the signal, and obviously not a good representation of the background near the signal. When this data is analyzed and plotted as Rk_z^4 –vs- k_z it has a high Q tail:

Note the increasing slope of the data and, when compared to the plot with no tail, the extended k range of the data. Now lets look at a better set of user entered regions:

and the associated plot
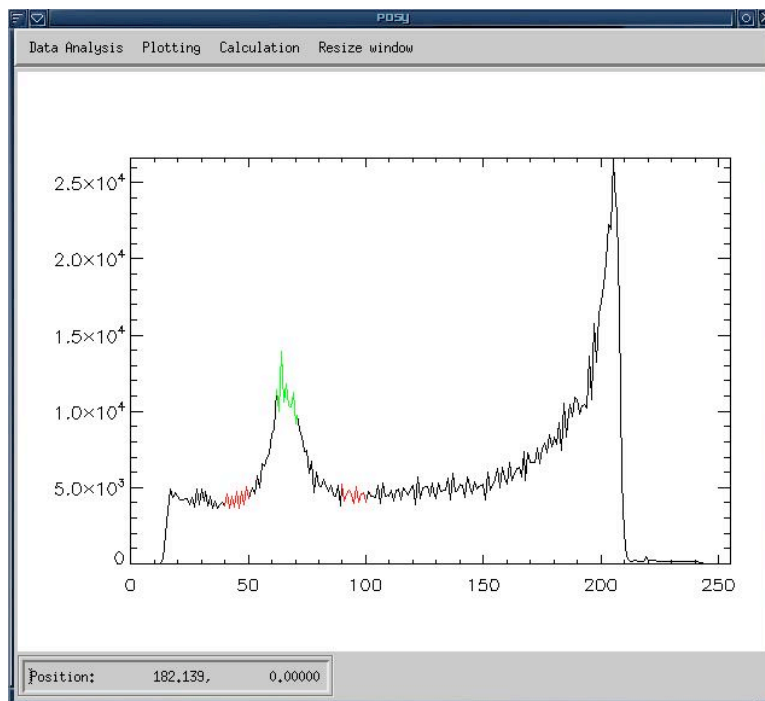
Note the background regions are near enough to the signal to be representative of the actual background, but not too close to the signal to include a significant amount of "non-background" counts. This set of regions does not generate a tail: